REMARKS

At the time of the Office Action dated June 15, 2007, claims 1-5 and 7-16, and 18-28 were pending in this application. Of those claims, claims 8-10, 12-14 and 18-22 have been withdrawn from consideration pursuant to the provisions of 37 C.F.R. §1.142(b).

In this Amendment, claims 1 and 15 have been amended and claims 7 and 23-28 canceled, without prejudice, reserving right to prosecution in a continuation application. Care has been exercised to avoid the introduction of new matter. Specifically, claims 1 and 15 have been amended to include the limitation of claim 7, to improve wording of one recitation regarding the insulting base material, and to delete another recitation regarding the insulating base material.

Claims 1-5, 11, 15, and 16 are now active in this application, of which claims 1 and 15 are independent. A Request for Continued Examination is filed herewith.

Claim Objections

Objection has been made to claim 25 because of the spelling error of the word "base." However, this objection has been rendered moot by the cancellation of claim 25. Withdrawal of the objection to claim 25 is, therefore, respectfully solicited.

Claims 1-5, 7, 11, 15, 16, 23, and 24 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kaneshiro et al. in view of Bergmann et al., and further in view of Nojima et al.

Independent claims 1 and 15 have been amended to include the limitations of claim 7. Accordingly, Applicants will address the Examiner's rejection of claims 1, 7, and 15. It is noted that the rejection of claims 7, 23, and 24 has been rendered moot by the cancellation of the claim.

With respect to independent claims 1 and 15, the Examiner admitted that Kaneshiro et al. does not disclose the projections having 1 nm to 20 nm in average diameter and the insulating base material including at least one of photopolymerizable thermosetting resin or an epoxy compound, epoxy resin, BT resin, and liquid crystal polymer. However, the Examiner asserted that Bergmann et al. and Nojima et al. teach the missing features of Kaneshiro et al.

Regarding claim 7, the Examiner admitted that Bergmann et al. does not explicitly disclose the projections formed in a number density of not less than 0.5×10^3 μm^{-2}. However, the Examiner asserted that the density range would have been obvious because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. The Examiner continued to assert that the specification contains no disclosure of either the critical nature of the claimed dimensions or any unexpected results arising therefrom, and where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, Applicants must show that the chosen dimensions are critical.

Applicants respectfully traverse the above rejections. Kaneshiro et al., Bergmann et al., and Nojima et al., either individually or in combination, do not disclose or suggest a semiconductor module including all the limitations recited in independent claims 1 and 15. Specifically, the applied combination of the references does not teach, at a minimum, that the base material is provided with minute projections on the surface thereof that is in contact with the insulator, and the minute projections include the plurality of projections of 1 nm to 20 nm in

average diameter and formed in the number density of not less than 0.5×10^3 μm^{-2}, as recited in the claims.

Minute Projections and Nonoparticles

According to the Examiner, Bergmann et al. discloses a semiconductor device comprising a plurality of nanoparticles having 10 to 50 nanometers in average diameter in order to use for low-viscosity adhesive base compositions (paragraphs [0037]). The Examiner appears to indicate that the nanoparticles of Bergmann et al. correspond to the claimed minute particles.

However, the nanoparticles do not correspond to the minute projections. According to Bergmann et al., the nanoparticles are used in an adhesive base composition and are not part of metallic surfaces 3 sandwiching the adhesive base composition.

In contrast, the claimed minute projections are part of the insulating base material. Claim 1 recites, "said insulating base material is provided with minute projections on a surface thereof." By allowing the insulator to enter a space between minute projections and to be solidified then, adhesion between the insulating base material and the insulator is improved by virtue of the anchor effect. The nanoparticles of Bergmann et al. are present separately from metallic surface 3. As such, the nanoparticles in Bergmann et al. cannot provide the same advantage as that of the claimed subject matter.

Further, paragraph [0055] of Bergmann et al. describes that agglomerates 6 include nanoparticles 7. As shown in Fig. 1, each of nanoparticles 7 is not present by itself in adhesive base composition 8, but is in the form of agglomerates 6. In contrast, each of the claimed minute projections can be included separately from others in the insulating base material.

Accordingly, the nanoparticles of Bergmann et al. does not teach the minute projections. It should be apparent that persons skilled in the art would not be motivated to modify

Kaneshiro's insulating base material 5A to have minute projections with 10 to 50 nanometers in average diameter to arrive at the claimed minute projections. The nanoparticles of Bergmann et al. are different from the claimed minute projections and the roughened surface of Kaneshiro et al.

Number Density of Minute Projections

With respect to the claimed number density of the minute projections of not less than 0.5 x 10^3 μm^{-2}, Applicants submit that the claimed range is critical and provides an unique advantage, in response to the Examiner's argument that Applicant must show that the chosen dimensions are critical (see paragraph bridging pages 5 and 6 of the Office Action). The following is reproduction of the relevant description of the specification which describes that the claimed range is critical and provides an unique advantage (page 5, lines 8-15):

> It is preferable that the minute projections include a plurality of projections of 1 nm to 20 nm in average diameter. Also, a number density of the projections is preferably not less than 0.5 x 10^3 μm^{-2}, more preferably in a range of 0.8 x 10^3 μm^{-2} to 2.0 x 10^3 μm^{-2}. Particularly, a range of 1.6 x 10^3 μm^{-2} to 2.0 x.10^3 μm^{-2} is most preferable. With such minute projections, the adhesion at an interface between the insulating base material and the insulator can be more prominently improved.

It is apparent from the above paragraph, Applicants clearly describes that the range "not less than 0.5 x 10^3 μm^{-2}" is critical and provide the unique advantage.

Furthermore, the minute projections are recited in claims 1 and 15 in a manner clearer than that in Kaneshiro et al. The claims recites both the average diameter and the number density of the minute projections, while Kaneshiro et al. simply describes a surface roughness represented by an arithmetic average roughness.

It is noted that Nojima et al. is silent on the claimed minute projections. Thus, Nojima et al. does not cure the deficiencies of Kaneshiro et al. and Bergmann et al.

Based on the foregoing, Kaneshiro et al., Bergmann et al., and Nojima et al., either individually or in combination, do not disclose or suggest a semiconductor module including all the limitations recited in independent claims 1 and 15. Dependent claims 2-5, 11, and 16 are also patentably distinguishable over Kaneshiro et al., Bergmann et al., and Nojima et al. at least because these claims include all the limitations recited in independent claims 1 and 15, respectively. Applicants, therefore, respectfully solicit withdrawal of the rejection of the claims and favorable consideration thereof.

Claims 25-28 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kaneshiro et al. in view of Nojima et al.

This rejection has been rendered moot by the cancellation of claims 25-28. Applicants, therefore, respectfully solicit withdrawal of the rejection of the claims.

Conclusion

It should, therefore, be apparent that the imposed rejections have been overcome and that all pending claims are in condition for immediate allowance. Favorable consideration is, therefore, respectfully solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper,

including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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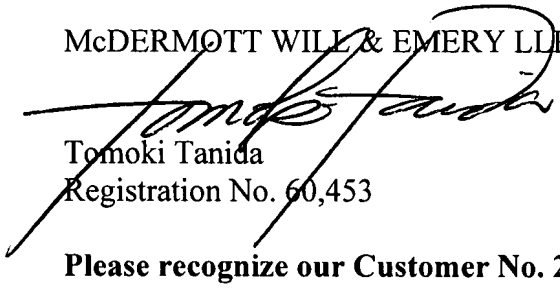

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